Bonneville Power Administration
Fish and Wildlife Program FY99 Proposal

Section 1. General administrative information

Identify resident fish and macroinvertebrate taxa and function in anadromous habitat

Bonneville project number, if an ongoing project 9046

Business name of agency, institution or organization requesting funding
Methow Biodiversity Project

Business acronym (if appropriate) MBP

Proposal contact person or principal investigator:

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Subcontractors/Joint Sponsors

Organization[1]	Mailing Address	City, ST Zip	Contact Name
Okanogan National Forest	1240 South Second Avenue,	Okanogan, WA 98840	Jennifer Molesworth

NPPC Program Measure Number(s) which this project addresses

NMFS Biological Opinion Number(s) which this project addresses.
NA

Other planning document references.
Chewuch River Watershed Analysis (pg 147 Key Questions); see also Northwest Forest Plan, Interior Columbia Basin Ecosystem Management Project, PACFISH for ecosystem management objectives

Subbasin. List subbasin(s) where work is performed. Use commas to separate multiple subbasins. Coordination projects or those not affecting particular subbasins may omit this field.
Methow River Watershed

Short description
Identify resident and non-game fish species and macroinvertebrate genera presence, relative abundance and distribution in the Methow watershed, and assess the ecological role these organisms play in anadromous fish habitat.

Section 2. Key words

	Categories		Activities		Project Types
	Anadromous fish		Construction		Watershed
X	Resident fish		O & M		Biodiversity/genetics
	Wildlife		Production		Population dynamics
	Oceans/estuaries		Research	X	Ecosystems
	Climate	X	Monitoring/eval.		Flow/survival
	Other		Resource mgmt		Fish disease
			Planning/admin.		Supplementation
			Enforcement		Wildlife habitat enhancement/
			Acquisitions		restoration

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship
9603401	Methow Valley Irrigation Conversion	Both address ecological constraints on anadromous fish
9604000	Wenatchee and Methow Coho Restoration	Our project creates a baseline for assessing resident fish/coho interactions and impacts

Section 4. Objectives, tasks and schedules

Objectives and tasks

Ob #	Objective	Task ID	Task
1	Identify resident fish species present	A	Sample all habitat types
2	Assess resident fish relative abundance	B	Quantify species present
3	Evaluate resident fish distribution	C	Sample throughout watershed

4	Identify macroinvertebrates (MI) present	D	Sample all habitat types
5	Assess MI relative abundance	E	Quantify taxa identified
6	Evaluate MI distribution	F	Sample throughout watershed
7	Assess role of resident fish in anadromous fish habitat	G	Observe and assess resident/anadromous interactions and niche partitioning
8	Enhance management capabilities for resident fish	H	Report findings to management agencies
9	Create a baseline databank for current status of resident fish and MI in the watershed	I	Report findings to management agencies

Objective schedules and costs

Partition overhead, administrative, support, and any other common costs shared among objectives. The percentages for all objectives should total 100%. Enter just the objective numbers from Column 1 in the above table. Enter start and end dates for each objective using the mm/yyyy format (e.g. 05/2002 for May, 2002).

Objective #	Start Date	End Date	Cost %
1	**06/1999**	**06/2000**	**15**
2	**06/1999**	**06/2000**	**5**
3	**06/1999**	**06/2000**	**10**
4	**06/1999**	**06/2000**	**20**
5	**06/1999**	**06/2000**	**5**
6	**06/1999**	**06/2000**	**10**
7	**06/1999**	**10/2000**	**25**
8	**06/1999**	**12/2000**	**10**
9	**06/1999**	**12/2000**	(included in objective 8)
			Total: 100%

Schedule constraints. Identify any constraints that may cause schedule changes. Describe major milestones if necessary.
None

Completion date. Enter the last year that the project is expected to require funding.
2000

Section 5. Budget

FY99 budget by line item

Item	Note	FY99
Personnel		7230.00
Fringe benefits		0.00
Supplies, materials, non-expendable property		1250.00
Operations & maintenance		0.00
Capital acquisitions or		

improvements (e.g. land, buildings, major equip.)	0.00
PIT tags	0.00
Travel	420.00
Indirect costs	0.00
Subcontracts	0.00
Other	0.00
TOTAL	$8900.00

Outyear costs

List budget amounts for the next four years, and the estimated percentage of those costs for operations and maintenance (O&M).

Outyear costs	**FY2000**	**FY01**	**FY02**	**FY03**
Total budget	$8980.00	0.00	0.00	0.00
O&M as % of total	0%			

Section 6. Abstract

This project identifies, quantifies and evaluates two critical but little-studied components of anadromous fish spawning and rearing habitat in the Methow watershed: resident fish and benthic macroinvertebrates. The goals of the project are 1) To clarify the ecological relationship between anadromous and resident fish and macroinvertebrates; 2) To create baseline data on the current status of resident fish and macroinvertebrates in the basin; and 3) To enhance management of biological diversity in the watershed . Objectives are 1) An inventory of presence, relative abundance and distribution of resident fish and macoinvertebrates in the watershed; 2) Observation of anadromous/resident fish interactions, niche preference and niche exclusion; and 3) Presentation of data and recommendations to responsible agencies on management needs of resident fish. All field work is based on currently accepted protocols. The project will begin in May, 1999; the final report will be completed by the end of December, 2000. Objectives are quantifiable and will face an in-house review and evaluation process. The project improves the ability to manage both anadromous and resident fish by clarifying current fish species configuration and habitat utilization and creating a baseline inventory for monitoring change over time.

Section 7. Project description

A. Technical and/or scientific background:

The Methow River watershed retains a high measure of ecosystem integrity and anadromous/migratory fish diversity, if not abundance. Spring and summer chinook and sockeye continue to return from the Pacific, while coho are about to be reintroduced. Migratory and resident bull trout and westslope cutthroat are still extant. While twenty years of studies document the presence and behavior of these salmonid species, no studies are known to have been conducted on resident, non-game fish species. Only cursory

investigations have been made of the macroinvertebrate fauna. The problem then, is that anadromous fish have been studied in a vacuum, and little or nothing is known of the critical faunistic components with which anadromous fish interact as they spawn, hatch and rear. With no previously recorded baseline data on the faunal assemblage in the watershed, there is no way to recognize or monitor change in species composition over time, nor is it possible assess the impact of anadromous management strategies on resident populations, or visa versa.

This project rectifies this oversight by inventorying resident non-game fish and macroinvertebrates throughout the watershed, and mapping fish species and macroinvertebrate families presence, distribution and relative abundance throughout the watershed. It observes niche utilization by fish species and records observable resident/anadromous interactions. Clarifying the characteristics of the non-anadromous macro fauna of any riverine system is a critical and logical component of a landscape approach to ecosystem management.

The dearth of available data on this macro fauna should be emphasized. A literature review shows only an incomplete reference to species composition. Discussions with several biologists who have invested considerable time and energy in salmonid studies in the watershed reveal little or no knowledge of the kind of information that this project will provide.

Principle previous studies of fish and macroinvertebrate presence and ecology in the Methow and related watersheds include the following:

Bryant, F.G., and Z.E. Parkhurst. 1950. Survey of the Columbia River and its tributaries; area III, Washington streams from the Klickitat and Snake Rivers to Grand Coulee Dam. USFW, Special Science Report 37.

Hillman, T.W. et al. 1990-1997. Summer/Fall Chinook Salmon lSpawning Ground Surveys in the Methow and Okanogan River Basins. Prepared by Don Chapman consultants for Chelan County PUD.

Kohn, M. 1978-89. Spring and summer chinook spawning ground surveys, Methow and Okanogan river basins. By Yakima Indian Nation for Chelan Co PUD, Wenatchee Wa

Li, J. L., and K. Wright. 1995. A survey of eastside ecosystem benthic invertebrates. Eastside Ecosystem Management Project.

Mullan, J.W. et al Production and habitat of salmonids in mid-Columbia River tributary streams, USFW Monograph I, 1992

B. Proposal objectives

1. Identify resident non-game fish species present in lotic systems throughout the watershed.
2. Assess resident non-game fish relative abundance.
3. Demarcate resident non-game fish distribution.
4. Identify macroinvertebrate families present in lotic systems throughout the watershed.
5. Assess macroinvertebrate relative abundance.
6. Demarcate macroinvertebrate distribution by families.
7. Assess the role of resident non-game fish in anadromous habitat in the watershed.
8. Enhance management capabilities for resident non-game fish by providing accurate data on presence, relative abundance and distribution in the watershed to management agencies (USFW, USFS and WDFW).
9. Create a baseline databank for resident non-game fish species and macroinvertebrate families (presence, distribution, abundance) in the watershed and supply to management agencies (USFW, USFS and WDFW).

C. Rationale and significance to Regional Programs

The concept of managing natural systems on a watershed or ecosystem scale, rather than managing for specific species, has gained considerable credibility in the past decade. National Forest managers are moving strongly in this direction, subsuming specific goals and interests under the umbrella of maintaining overall ecosystem integrity. The 1994 Northwest Forest Plan and the recently developed Interior Columbia Basin Ecosystem Management Plan both strive to develop this broader view of land management.

Applying the paradigm of ecosystem or watershed level management to riverine systems requires that attention and resources be allocated to components of that system other than those that immediately and obviously concern anadromous fish. While general hydrologic function of these systems has been addressed in recent years through stream survey and analysis, in many cases the non-anadromous faunistic component of these systems has been ignored. As mentioned previously, after 20 years of fish-related aquatic studies in the Methow Basin, the actual components of the aquatic fauna here remain a matter of speculation. Because only studies of "game" fish have been funded, only this type of information has been gathered.

It is impossible to understand the interactions of ecosystem components without a basic composite picture of what those components are. Resident fish and macroinvertebrates are major constituents of the aquatic system in which anadromous function, and yet next to nothing is known of their roles in the system. This project rectifies this oversight both for the Methow and for comparable eastside riverine systems by identifying these organisms, by evaluating their ecological niches in the watershed, and by observing and elucidating interactions with anadromous fish.

D. Project history

The fact that there is no history for this project illuminates the need for it. There has been no systematic study of the riverine fauna of the Methow basin other than for game species.

E. Methods

Presence, relative abundance and distribution of native non-game fish species will be determined by surveys in multiple habitats throughout the watershed. Sample reaches will be identified in each of the major tributaries of the Methow (the Chewuch, Twisp and Lost Rivers, the West Fork and lower Methow), and in lower order tributaries. Riffles, pools, glides and side channels will be inspected for presence and abundance of species using site-appropriate techniques. It is anticipated that 60 reaches of 200 meters each over a broad spectrum of gradients will be sampled in 1999. Surveys will be conducted over three seasons, in different climatic conditions, and across a spectrum of daylight and night hours to observe changes in species composition and interspecific behavior. Survey techniques that will be utilized include snorkeling, minnow traps, seine and kick nets, and electroshocking (electroshocking will be minimized, and all such operations will be conducted by certified personnel). The screw trap operated by the Yakama Indian Nation will also be inspected on a regular basis to monitor species composition. Species that cannot be identified by sight will be captured and keyed.

The principle survey technique when appropriate will be snorkeling. This will allow workers to observe species abundance, niche partitioning and anadromous/resident interactions. In mainstem reaches multiple snorkelers will float downstream, maintaining a prescribed spacing from one another by holding on to connected lengths of PVC pipe. Spacing is determined by underwater visibility. Snorkelers count only those fish that pass underneath in a lane between themselves and their adjacent workers. On smaller streams two snorkelers begin at the downstream end of a reach and proceed upstream slowly, counting only fish in their lane.

The relative abundance and diversity of benthic macroinvertebrates will be determined using the Surber stream bottom sampling method (Needham, 1962). The Surber sampler is placed in the riffle portion of a stream less than 18 inches deep. The net is placed in the stream with the opening upstream. The frame is worked into the bottom. The sampler is held in position by straddling the sampler and holding the frame between the legs.

The hands are then used to pick up the larger stones and wash organisms from them into the net. After the larger stones have been picked up, washed, and discarded, the remainder of the area inside the frame is gently churned up with the fingers to release organisms from the substrate. The material trapped in the net is then concentrated within the net using the stream current. The contents of the net are then collected into a sample container by reversing the net

into the container and rinsing it with 200 milliliters 70% isopropyl alcohol. The sample is then transported to the laboratory for analysis.

In the laboratory, 100 grams of NaCl followed by the Surber sample is added to an erlynmeyer flask. The Surber sample saturated with NaCl fills the erlynmeyer flask to the top. Most organisms and some debris float to the top. The debris that floats to the top is removed using thumb forceps. Approximately 25 - 50 milliliters of sample is decanted into a petri dish. The contents of the petri dish are then examined using a stereomicroscope at 10X magnification. The organisms observed are then identified to family.

F. Facilities and equipment

All equipment and facilities needed for the project are on hand, including dry suits, Surber samplers, kick and seine nets, minnow traps, thermographs, waders, taxonomic keys, stereoscopes, computers, laboratory space and transportation.

G. References

Bryant, F.G., and Z.E. Parkhurst. 1950. Survey of the Columbia River and its tributaries; area III, Washington streams from the Klickitat and Snake Rivers to Grand Coulee Dam. USFW, Special Science Report 37.

Chapman, W. M., and E. Quistorff. 1938. The food of certain fishes of north central Columbia River drainage, in particular, young chinook salmon and steelhead trout. WA Department of Fisheries, Biol. Rep.

Ebel, W.J. et al. 1989. The Columbia River- toward a holistic understanding. Can. Spec. Publ. Fish. Aquatic. Sci. 106.

Hillman, T.W. 1989. Noturnal predation by sculpins on juvenile chinook salmon and steelhead. pp. 249-264. In Don Chapman Consultants (eds). Summer and winter ecology of juvenile chinook salmon and steelhead trout in the Wenatchee River, Washington. Rep. to Chelan Co. Public Utility Dist., Wenatchee, WA.

Hillman, T.W. 1991. The effect of temperature on the spatial interaction of juvenile chinook salmon and the redside shiner and their morphological differences. Ph.D. Thesis, Idaho State University, Pocatello, Idaho.

Hillman, T.W. et al. 1990-1997. Summer/Fall Chinook Salmon Spawning Ground Surveys in the Methow and Okanogan River Basins. Prepared by Don Chapman consultants for Chelan County PUD.

Independent Scientific Group. 1996. Return to the river: restoration of salmonid fishes in the Columbia River ecosystem.

Kohn, M. 1978-89. Spring and summer chinook spawning ground surveys, Methow and Okanogan river basins. By Yakima Indian Nation for Chelan Co PUD, Wenatchee Wa

Li, J. L., and K. Wright. 1995. A survey of eastside ecosystem benthic invertebrates. Eastside Ecosystem Management Project.

Mullan, J.W. et al 1992. Production and habitat of salmonids in mid-Columbia River tributary streams, USFW Monograph I.

Needham, J.G. and P.R. Needham 1962. A Guide to the Study of Fresh-Water Biology. Holden-Day, Inc., San Francisco.

Okanogan National Forest, 1994. Chewuch River watershed analysis.

Ruggles, C.P. 1959. Salmon populations and bottom fauna in the Wenatchee River, Washington. Trans. Am. Fish. Soc. 88(3) 186-190.

Section 8. Relationships to other projects

The Okanogan National Forest, which manages 90% of the land mass and lotic systems in the Methow watershed, is currently conducting watershed analysis for all key tributaries in the watershed, and stream surveys for all know salmonid-bearing streams. Because the funding for these projects is targeted to gathering data on salmonid species and habitat, no allocation of funds or time is made for resident non-game fish nor for macroinvertebrates. Recognizing this failure to assess critical ecosystem components, a "Key Question" posited in the watershed analyses is, "What is the present distribution of fish species in the watershed?" This project proposed here responds to that critical question, thereby complementing and completing the inventories conducted under the auspices of watershed analysis.

As noted in Section 3, two BPA projects are either under way (9603401) or planned (9604000) for the Methow watershed. This proposal offers a broader perspective on the ecosystem in which those two programs function by defining the other major faunistic components of the river.

Section 9. Key personnel

Dana Visalli, project codirector. Education: Master of Arts, Environmental Studies, Norwich University, Montpelier, Vermont. 1991; Bachelor of Science in Biology, University of New Mexico, Albuquerque, New Mexico. 1989. Languages spoken: English, Spanish, Russian. Currently: Consulting Biologist, Winthrop, WA, 1991 to present. Projects include the

following: Director, Methow Biodiversity Project, a watershed based biological inventory and enhancement program coordinating the following: an anadromous fish education project, butterfly species inventory, bat species inventory, amphibian distribution and population monitoring, annual migratory bird count, reproductive enhancement project for wood ducks, and kestrels, inventory of harlequin duck presence and distribution in the Methow watershed, editing the quarterly journal *The Methow Naturalist.* Recent biological duties include the following:
Inventory of mosses and lichens of the Okanogan National Forest and development of an herbarium collection of same for the Washington Native Plant Society, 1996-1998.
Inventory of amphibian species presence, abundance and reproductive success in the Methow River watershed; a cooperative program with the US Forest Service initially funded by World Wildlife Fund. 1994-1997.
Fisheries biologist on chinook salmon spawning ground surveys on the Similkameen, Methow and Okanogan Rivers, Don Chapman Consultants, Boise, Idaho. 1992-1994.
Fisheries biologist for National Oceanic and Atmospheric Administration, winter, 1991-92 and winter 1992-93.

Jennifer Molesworth, project co-director. Education: Bachelor of Science degree in Biology and Aquatic Ecology, State University of New York, 1981. Professional experience: fish biologist with the US Forest Service since 1989, serving as the Methow Valley District fish biologist since 1992, with responsibility for the district's fish program. As part of her work, she has completed a habitat assessment for all anadromous fish-bearing streams on the district.

Section 10. Information/technology transfer

The intent of the this project is to enable the responsible management agencies to incorporate a broader sweep of organisms into their ecosystem management strategy for the Methow watershed. A full report of findings is written into this project; this report will be distributed in both electronic and hard copy format to the Okanogan National Forest, the US Fish and Wildlife Service, and the Washington Department of Fish and Wildlife.